

Inventory and Digital Infrastructure of Historic Louisiana Geological Map Data

Award Number: G10AC00111

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Project Term: July 1, 2010 to June 30, 2011

Submittal Date: September 28, 2011



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Abstract

During the FY 2008 phase of the National Geological and Geophysical Preservation Program (NGGDPP), the Louisiana Geological Survey (LGS) directly addressed two of the program priorities: creating an inventory of the LGS historic geologic map collection and improving upon the state and national digital map infrastructure.

Thousands of published and unpublished geologic maps, cross-sections, sample site maps, and other geo-data dating back over a century exist in LGS cartographic storage rooms. This un-indexed material consists of lithographic prints, working drafts, historic reference maps, and many original manuscripts on linen, vellum, positive and negative film, contact prints, and even some metal plates.

The LGS inventory team began an effort to systematically conduct a proper inventory, assess the quantity, condition, and importance of the material, and catalog retained items into a relational database. A catalog record for each document was prepared and the on-line inventory completed on the Data Preservation website.

The LGS digital infrastructure team handled the maps, cross-sections, and geologic diagrams selected by the inventory team as candidates for digitization. Items were scanned at high resolution, post-processed in Photoshop, and metadata records were prepared and uploaded to the National Digital Catalog portal.

Introduction

The Louisiana Geological Survey (LGS) has completed requirements set by the National Geological and Geophysical Data Preservation Program (NGGDPP) for FY2010. The primary priorities of this grant were to create a cataloged inventory of the LGS historic map collection and to enhance the national digital infrastructure by digitizing maps and other geologic documents. This Final

Technical Report describes FY 2010 project details and includes LGS objectives for the FY 2011 grant period.

Background: The Louisiana Geological Survey (LGS) has been in existence since 1934 and predecessor agencies go back to the 1860's. Published and unpublished maps dating back to the 1870's exist in LGS cartographic storage rooms and much data has been retained by generations of cartographers. A wealth of geologic and topographic data exists in this material which consists of lithographic publications, working drafts, historic reference maps, and many original manuscripts on linen, vellum, positive and negative film, contact prints, and even some metal plates. Much of this data is from publications long out of print and some are unpublished manuscripts unknown to the research community.

Unfortunately, while much of this data has been fastidiously preserved and kept in climate controlled storage, over 100 years of agency changes and at least five major moves to different buildings on campus since 1934 have resulted in a collection that is almost unusable due to an inadequate inventory and proper cataloging of the material. Most of it exists in many hundreds of un-indexed tubes and dozens of flat and vertical filing cabinets.

Objective: The objective of the effort was to systematically inventory, catalog, and archive this valuable map data in order to make it searchable and accessible to the public. We believed this effort to be compatible with the FY2010 Program Priorities in the categories: 1—Collection Inventories and 3—Digital Infrastructure. Since it was difficult to predict the quantity, condition, and importance of the data until it was inventoried, the principle endeavor was to conduct a proper inventory and catalog it to National Digital Catalog standards.

Far less than 100% of the data was suitable for digital capture and metadata production, but an effort to begin that process on the most fragile and valuable maps was included.

Team: The LGS staff team involved in this effort was John Snead, Patrick O'Neill, Reed Bourgeois, and R. Hampton Peele and by student assistant Carl Salo.

Key tasks

In July 2010, LGS received funding under NGGDPP Award G10AC00111 to inventory the historic geological map collection and enhance the digital infrastructure of state geological maps. The existing collection is stored in many hundreds of un-indexed tubes and dozens of flat drawer cabinets and vertical map filing cabinets. An estimate of the number of individual map sheets involved was 2,500 to 6,000, but no inventory existed. Both surface and subsurface geologic maps are included, many cross-sections and profiles, oil and gas maps, mineral resource maps, water resource maps, sample locations, and other geologic data including hand-drawn foraminifera and other fossil illustrations. This material meets the objectives of the NGGDPP: (1) Archive geologic, geophysical, and engineering data, maps, well logs, and samples; and (2) Provide a national catalog of such archival material.

Collection Inventory Methodology

A five-task process was performed on each record selected for the collection inventory effort:

- 1. Carefully examined each map tube or folder** in the non-inventoried collection. Many contained multiple documents and some contained fragile documents. Each document was assessed initially for condition and technical significance for retention in the LGS Geological Map Archives.
- 2. Discarded items that did not meet the criteria for retention.** Some fragile, old documents have crumbled, deteriorated, darkened, or faded completely and are past conserving. They have been disposed of or set aside for conservation if valuable. Duplicate documents and documents not appropriate to the LGS Geological Map Archives have been noted and will be offered to other archives and map libraries.
- 3. Assigned an inventory control number** to each retained document. A small sticker with an ICN will be affixed to each document.
- 4. Created a catalog record** for each retained document, gathering title, author, date, publisher, scale, storage unit, condition, media type, document type, size, and other data will be determined from the map keys and title blocks or from labels attached to their original storage tubes and folders. A short description was created for untitled documents and keywords for each document were entered based on assessment of the item. These records were created in a Filemaker Pro relational database.
- 5. Selected maps and diagrams for digitization.** Certain maps were deemed candidates for inclusion in the digital infrastructure effort and were set aside to be scanned and processed.

Digital Infrastructure Methodology

A five-task process was performed on each document selected for digital conversion:

- 1. Assessed the candidate document** for geologic importance, potential for use, and physical condition using the information from the inventory and cataloging effort. The items were prioritized based on this information with emphasis given to first preserving the most fragile items.
- 2. Prepared the physical documents for scanning** by carefully removing them from their storage tubes or folders. Items that have been stored for decades in rolled small tubes sometimes needed several weeks of flattening on large tables to reduce the curl in the media before scanning. The most fragile items were placed in a clear poly folder to preserve the original from the roll-fed scanner contact.
- 3. Scanned the original document** using the 54" or 56" roller-fed scanners or the 18 x 24" flatbed scanner as was most appropriate, scanning at the maximum resolution at 100% size for archival copies. Returned the original to its designated new storage medium.

4. Post-processed the scanned image digitally to enhance the contrast, brightness, sharpness, levels, and color balance; rotated and cropped as is appropriate, and removed digital artifacts from the image. Saved the image both as a lossless TIFF file and as a compressed JPEG file in the archive.

5. Prepared a metadata record using the inventory catalog information and information from the digital conversion effort. Used the template provided by the NGGDPP to produce the file format that will import into the National Digital Catalog portal. Saved a metadata file to accompany the data files in the archive.

Results

Collection Inventory effort

The collection inventory effort successfully assessed and inventoried the entire archives that were stored rolled in tubes or in racks of rolled items. This is approximately one third of the material in the archives; the rest of it is stored in flat drawers or in vertical flat files. Approximately 700 tubes and roll rack spaces were examined.

One of the unexpected surprises of the effort was the sheer number of items discovered in many individual tubes. Even the smaller 2" tubes sometimes held 10-12 tightly rolled maps.

Approximately 2,500 total items were assessed. Approximately 900 of these were multiple duplicate items, which required only a single catalog entry in the database. Availability of duplicate copies was noted in the database as well.

There were a surprising number of items that were discarded, approximately 1000. Most of these were very old blue-line and van-dyke positives and negatives (many in duplicate) that had faded or darkened to the point of uselessness. Fortunately, most of these were duplicates of a manuscript original or a film positive or negative that was retained and was suitable for inventory. Among the final drafted maps and cross-sections were a number of superseded drafts, authors' worksheets, and other work-up material unsuitable for archiving. These were also discarded or returned to their authors, if still living.

After assessing the 2,500 items, discarding 1,000 superfluous, damaged, or otherwise unusable items, and accounting for 900 duplicates, 579 items were cataloged in the database.

Among these items were:

- 91** multicolored lithographs
- 25** monochrome lithographs
- 312** manuscripts
- 134** Diazo prints
- 13** photographic positive and negative film reproductions
- 4** color ink-jet plots

Among the subjects noted were:

299 oil and gas field maps
25 pipeline maps
65 geologic maps
60 geologic cross-sections
96 reference maps
34 base maps

Date ranges of the material:

3 from the 1920's
32 from the 1930's
82 from the 1940's
86 from the 1950's
122 from the 1960's
46 from the 1970's
59 from the 1980's
1 from the 1990's

Digital Infrastructure effort

The digital infrastructure effort successfully scanned maps and sections and created metadata records of the inventoried items deemed relevant and useful for digitization.

Problems encountered in this project were limited to the reliability issues and eventual breakdown of our original oversized scanner. Fortunately, the LGS was able to procure and install a new 56" scanner before the end of the project and was able to complete all material waiting to be scanned.

The 579 items from the Collection Inventory effort were assessed for geologic importance, potential for use, and physical condition. Approximately 175 items were reference maps or other proprietary, copyrighted material that was deemed inappropriate for LGS to scan and make available. 190 were deemed to be unsuitable for scanning, such as color separates and a few extremely fragile items. 175 others were deemed to be of subject matter unlikely to be widely used. 39 were maps from other agencies that were already available online.

103 map and cross-section documents were scanned, processed, and digitally archived.

Metadata records for these documents were developed by processing the Collection Inventory relational database records. A subset database of the Digital Infrastructure documents was created with the following fields as required by the NGGDPP: *collectionID*, *title*, *abstract*, *dataType*, *supplementalInformation*, *coordinates*, and *datasetReferenceDate*. After a discussion with Richard Brown of USGS – Core Science Systems, we added an optional field, *alternateGeometry*, in which to indicate that the scan files of the 103 documents were not georeferenced.

Coordinates were left with null values, because the document scans were not georeferenced. In the future, as each image is georeferenced the associated NDC record will be updated to indicate the coordinates. *CollectionID* was left with null values at Richard Brown's suggestion that the appropriate collection identification would be automatically generated during the uploading process. A generalized referral to the LGS website was entered for all records in the *supplementalInformation* field. All other fields were populated within the subset database by either copying a field originating from the Collection Inventory database or concatenating a number of fields. A sample metadata record follows.

collectionID: <Null>

title: DOCUMENT ID: LGS-IDB-225 **TITLE:** Reconnaissance Gravity Map in the Gulf of Mexico **DATE:** 1947

abstract: DOCUMENT TITLE: Reconnaissance Gravity Map in the Gulf of Mexico
DATE: 1947 **AUTHOR/S:** Joesting, H. R. and Frautschy, J. D. **SCALE:** 1" = 2.5 Miles
Publisher: US Geological Survey

dataType: film positive

supplementalInformation: Map Repository managed by the Cartographic Section of the Louisiana Geological Survey. Contact information can be found at <http://www.lgs.lsu.edu/>

coordinates: <Null>

datasetReferenceDate: 2011-07

alternateGeometry: Not georeferenced

After final review, the Digital Inventory Database metadata records were translated into comma separated value (csv) format and emailed to Richard Brown for uploading into the National Digital Catalog on July 29, 2011.

Summary and objectives for future work

This year's project successfully assessed and inventoried all of the LGS map archival material that was stored rolled in map tubes or in racks designed for rolled material. A database of selected document records was created. A further selection of documents was scanned and digitally archived with metadata file uploaded to USGS.

Earlier NGGDPP projects prepared by the LGS involved cataloging core and well logs in the LGS core repository. This project was the first to catalog historic geologic map data in the cartographic section map repository. A new collection was therefore added to the LGS on-line inventory form at the Data Preservation website, collection ID P1276. Seven question pages were completed during the revision. The new collection information added:

Type of = Historic Louisiana geologic map collection

Category = maps

Current media = physical

Units of measure = items

Amount = 2500

Remaining to be assessed and inventoried is the map archival material stored in four large fireproof vertical storage cabinets (120 bins) and in 35 horizontal map filing cabinets (144 drawers). Most of these drawers and bins are stuffed with folders of un-inventoried material ranging back into the 19th century.

A 2011 NGGDPP proposal for the collection inventory and digital infrastructure of this flat material was submitted and has been awarded. Initial work is already underway on these documents.

Data preservation

Project data management and preservation: The digital inventory created by this project is in the form of a Filemaker Pro database. Currently this data is offline, but a new website is being prepared for the LGS and plans are being made to incorporate this data into the new site's data retrieval component.

The scanned documents and metadata files were saved in TIFF format, full scale at 400 DPI. Currently this data is also offline, but will be a part of the new website.

The database, digital files, and metadata files prepared by this project are stored on two external hard disk drives with additional copies on two LGS servers. Standard LGS protocols for backup and security are in place. In time the data will also reside on the university's planned Institutional Repository and enjoy full web access with NSF-compatible, professional data management and preservation protocols.

Long-term strategy for data preservation: The project addressed the initial data preservation plans that the Louisiana Geological Survey and Louisiana State University (LSU) seeks to implement. These goals, for the map repository, are to inventory, assess, catalog, conserve, and archive both physical and digital geologic map data. The initial milestone was to complete an inventory of the collection to assess the remaining effort in terms of the quantity of items, physical condition of the items, value of certain historic prints, and the importance of the geologic data.

The long-term strategy is to begin the integration of LGS digital map documents into a preservation scheme compatible with that of the University. LSU's scheme is undergoing evaluation to comply with the National Science Foundation's (NSF) data management mandate. The LSU Center for Computation and Technology recommends that a web-based Institutional Repository be considered the best way to meet the goals of campus libraries and research institutes and to satisfy requirements for data management and preservation. When implemented, the LGS data will become part of the LSU Institutional Repository.